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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,834	12/08/2003	Nick Kuo	JCLA11759	5204

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EXAMINER	
ANDUJAR, LEONARDO	

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/730,834	KUO ET AL.	
	Examiner	Art Unit	
	Leonardo Andújar	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,13,15-21,23-35,37-44 and 46-50* is/are pending in the application.

4a) Of the above claim(s) *23,24,35,37 and 46-50* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13, 15-21, 25-34, 38-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Acknowledgment

1. The amendment filed on 01/11/2006in response to the Office action mailed on 1/18/2005 has been entered. The present Office action is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 1-11, 13, 15-21, 23-35, 37-44 and 46-50.

Election/Restrictions

2. Applicant's election without traverse of species 4 (figs. 1d and 2d) in the reply filed on 9/07/2005 is acknowledged. Amended claims 23-24, 35, 37 and 46-50 were withdrawn from consideration because they are not supported by the elected species. Note that in figure 2 does not show "a third portion" (emphasis added). Note that the elected species includes only two portions one for a solder bump connection and a second one for testing or wire bonding.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 27-29, 32-34, 40-42 and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Lam et al. (US 6,511,901).

5. Regarding claim 27, Lam (e.g. fig. 2A-2I) shows a semiconductor substrate 104; a metallization 102 structure over the semiconductor substrate; a passivation layer 202 exposes a top surface of the metallization structure; a patterned circuit layer 204-208 connected to the top surface, wherein the patterned circuit layer comprises a first portion 214having a bump 122 formed thereover and a second portion 216 used to be wirebonded thereto (col. 1/23-33 & co. 2/lls. 30-51).

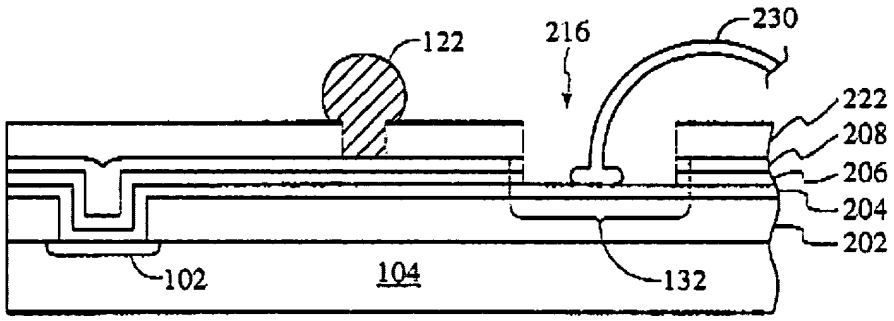


FIG. 2I

6. Regarding claims 28 and 29, Lam teaches that the patterned circuit layer may comprises gold or copper, (col. 3/lls. 62-67 & col. 4/lls. 1-7).

7. Regarding claim 32, Lam teaches a polymer 222 on the patterned circuit layer, an opening in the polymer layer exposing the first portion (col. 2/lls. 61-65 & col. 3/lls. 23-39).

8. Regarding claim 34, Lam shows that the patterned circuit layer comprises a metal trace connecting the firs and second portions.

9. Regarding claims 40 and 41, Lam shows solder bump 122 over the first portion (col. 2/lls. 39-41).

10. Regarding claim 42, Lam shows a copper layer between the bump and the first portion (col. 3/lls. 1-10).

11. Regarding claim 44, Lam shows a wirebonded wire 230 bonded over the second portion.

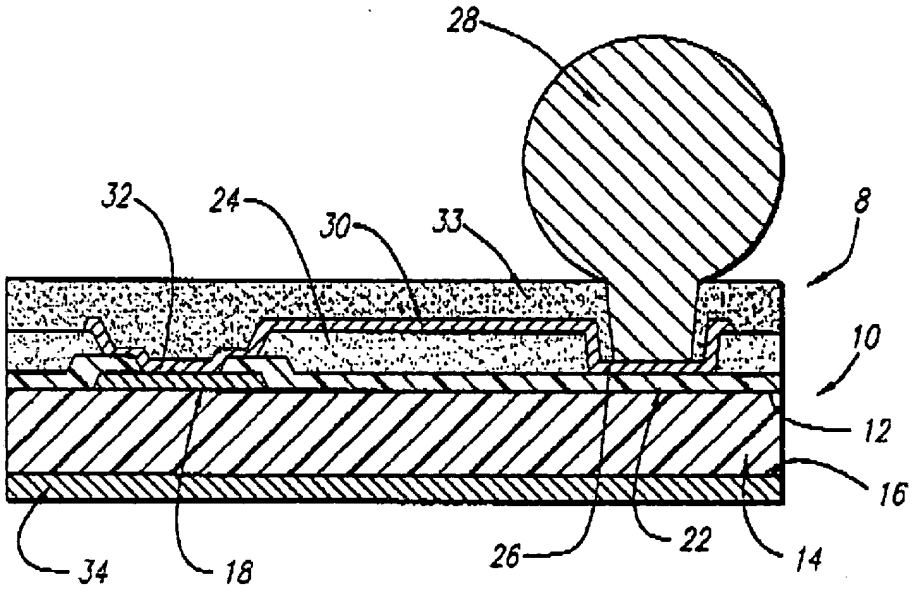
Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

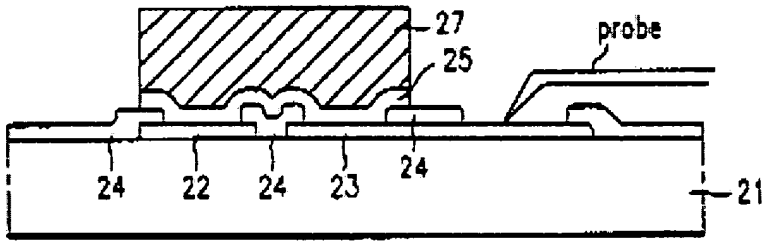
13. Claims 1, 4, 5, 8-11, 13, 17-20, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elenius et al. (US 6,287,893) in view of Kim (US 5,854,513).

14. Regarding claim 1, Elenius (e.g. figs. 1 & 2) shows a substrate 14, a metallization structure 18 over the semiconductor substrate; a passivation layer 22 over the metallization structure 18, wherein an opening in the passivation layer exposes a top surface of the metallization structure and a patterned circuit 30 connected to the top surface, wherein the patterned circuit layer comprises a first portion having a bump 28 formed thereover and a second portion (col. 1/lls. 22-45 & col. 6/lls. 1-37).



Elenius does not teach a testing pad or second portion used to be tested thereto. Nevertheless, Kim (e.g. fig. 3) shows a testing pad 23 electrically connected to a bump pad 22. This type of embodiment prevent decreases in testing reliability caused by damages on the surface of the bump and polluting material thereby enhancing its yield with respect to bonding (col. 2/lls. 10-30).

FIG.3



It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a second portion used to be tested thereto or include a test pad electrically in order to prevent decreases in testing reliability caused by

damages on the surface of the bump and polluting material during the testing process, thereby enhancing its yield with respect to bonding as taught by Kim.

15. Regarding claims 4 and 5, Elenius teaches that the patterned circuit comprises copper or nickel (col. 7/lls. 8-48).

16. Regarding claims 8 and 9, Elenius teaches a polymer layer 24 (e.g. polyimide) over the passivation layer whereon the patterned circuit layer is over the polymer layer (col. 6/lls. 51-56).

17. Regarding claims 10 and 11, Elenius shows a polymer layer 33 (e.g. polyimide) on the patterned circuit layer, an opening in the polymer layer exposing the first portion (col. 7/lls. 50-54).

18. Regarding claim 13, Elenius in view of Kim shows that the patterned circuit comprises a metal trace connecting the first and second portions.

19. Regarding claim 17, Elenius shows a bump on the first portion.

20. Regarding claim 18, Elenius discloses a nickel layer between the bump and the first portion (col. 7/lls. 8-48).

21. Regarding claim 19, Elenius discloses that the bump comprises a solder (col. 7/ll. 62).

22. Regarding claim 20, Elenius discloses a copper layer between the bump and the first portion includes a copper layer between the bump and the first portion (col. 7lls. 8-48).

23. Regarding claims 25 and 26, Elenius in view of Kim teaches most aspects of the instant invention except for the specific pitch between first and second portion is less

than 300 micrometers or less than 1 micrometer. However, it is known in the art that pitches are subjected to optimization, it is desirable to minimize the pitch between two contact areas the downscaling of the minimum feature sizes of the device. It would have been obvious to one of ordinary skill in the art at the time the invention was made to minimize the pitch between the first and second portions disclosed by Elenius in view of Kim to effectively reduce the overall device's size as it is known in the art. With regards to the specific pitches claimed by applicant i.e., a less than 300 micrometers or less than 1 millimeter, absent of any criticality is only considered to be the "optimum" pitch of the pitch disclosed by the Prior Art that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, size reduction, manufacturing costs, etc. (see In re Boesch, 205 USPQ 215 (CCPA 1980)), and since neither non-obvious nor unexpected results, i.e., results which are different in kind and not in degree from the results of the prior art, will be obtained as long as filled groove is used as already suggested by the Prior Art. Moreover, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990)

24. Claims 2 and 3, are rejected under 35 U.S.C. 103(a) as being unpatentable over Elenius et al. (US 6,287,893) in view of Kim (US 5,854,513) further in view of Sato et al. (US 4,051,508).

25. Regarding claim 2 and 3, Elenius in view of Kim teaches that most aspect of the instant invention except for a patterned circuit layer comprising a gold layer. Therefore, Elenius in view of Kim does not teach that the gold layer has a thickness greater than one micron. Nevertheless, Sato teaches that pattern circuit layer comprising a gold layer of 2 microns (col. 34/35). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the pattern circuit layer disclosed by Elenius in view of Kim comprising gold layer of 2 microns as suggested by Sato to increase the electrical conductivity of the patterned circuit layer and because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

26. Claims 6 and 7, are rejected under 35 U.S.C. 103(a) as being unpatentable over Elenius et al. (US 6,287,893) in view of Kim (US 5,854,513) further in view of Lee (US 20040036170).

27. Regarding claim 6 and 7, Elenius in view of Kim teaches most aspects of the instant invention including a patterned circuit layer (e.g. UBM). Elenius in view of Kim does not disclose that the patterned circuit layer includes a copper layer and a gold layer being over the copper layer. Therefore, Elenius in view of Kim does not teach a nickel layer between a copper layer and a gold layer. Nevertheless, Lee teaches an UBM comprising a copper layer, a gold layer over the copper layer and a nickel layer therebetween (pp 0006). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the pattern circuit layer/UBM disclosed

by Elenius in view of Kim comprising copper layer, a gold layer over the copper layer and a nickel layer therebetween as suggested by Lee to increase the electrical conductivity of the patterned circuit layer and because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

28. Claims 15 and 16, are rejected under 35 U.S.C. 103(a) as being unpatentable over Elenius et al. (US 6,287,893) in view of Kim (US 5,854,513) further in view of Kitayama et al. (US 5,646,439).

29. Regarding claims 15 and 16, Elenius in view of Kim teaches most aspects of the instant invention including a passivation comprising a topmost layer of the electronic component. Elenius in view of Kim does not disclose that the passivation layer comprise a nitride layer or a layer having a thickness greater than 0.35 micrometers. Nevertheless, Kitayama disclose that a passivation layer made of silicon nitride and having a thickness of more than 0.35 micrometer protects the wafer from moisture (col. 3/lls. 22-35). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the passivation layer disclosed by Elenius in view of Kim of silicon nitride and having a thickness greater than 0.35 as suggested by Kitayama in order to protect the internal circuits formed within the wafer from moisture and because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

30. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Elenius et al. (US 6,287,893) in view of Kim (US 5,854,513) further in view of Harper.

31. Regarding claim 21, Elenius in view of Kim teaches most aspects of the instant invention including a bump. Elenius in view of Kim does not teach that the bump can be made of a lead free alloy. Nevertheless, Harper (e.g. table 5.3) teaches several suitable lead free solder alloys that are compatible with the surface mount technology. Harper's table 5.3 discloses melting ranges of common solder alloys. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the bump disclosed by Elenius in view of Kim of a lead free alloy such as 95Sn/5Ag as suggested by Harper because this alloy has a relative high melting point, a high creep resistance (see table 5.5), it is more environmental friendly than lead alloys, and because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

32. Claims 30, 31 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lam et al. (US 6,511,901) in view of Elenius et al. (US 6,287,893).

33. Regarding claims 30 and 31, Lam teaches most aspects of the instant invention including a passivation layer but does not disclose a polymer layer over the passivation layer wherein the patterned circuit layer is a over the polymer layer. Therefore, Lam does not teach that the polymer layer comprises polyimide. Nevertheless, Elenius (e.g. fig. 2) shows a polymer layer 24 made of polyimide over a passivation layer 22 wherein a pattered circuit layer 30 is over the polymer layer (col. 6/lls. 51-56). According to

Elenius, this embodiment protect the solder bumps from fatigue induced by thermal coefficient differentials (col. 3/lls. 14-22). It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a polymer layer such as polyimide over the passivation layer disclosed by Lam wherein the patterned circuit layer is a over the polymer layer to protect the solder bumps from fatigue induced by thermal coefficient differentials.

34. Regarding claim 33, Lam teaches most aspects of the instant invention except for a polymer layer/passivation layer that comprises polyimide. Nevertheless, Elenius teaches that polyimide is a suitable material for passivation layers (col. 7/lls. 4-55). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the passivation layer disclosed by Lam of polyimide as suggested by Elenius since polyimide is a preferable material from the viewpoint of costs and ease of machining and because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

35. Claims 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lam et al. (US 6,511,901) in view of Kitayama et al. (US 5,646,439).

36. Regarding claims 38 and 39, Lam teaches most aspects of the instant invention including a passivation comprising a topmost layer of the electronic component. Lam does not disclose that the passivation layer comprise a nitride layer or a layer having a thickness greater than 0.35 micrometers. Nevertheless, Kitayama disclose that a passivation layer made of silicon nitride and having a thickness of more than 0.35

micrometer protects the wafer from moisture (col. 3/lls. 22-35). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the passivation layer disclosed by Lam of silicon nitride and having a thickness greater than 0.35 as suggested by Kitayama in order to protect the internal circuits formed within the wafer from moisture and because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

37. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lam et al. (US 6,511,901) in view of Kim (US 5,854,513) in view of Harper.

38. Regarding claim 43, Lam teaches most aspects of the instant invention including a bump. Lam does not teach that the bump can be made of a lead free alloy. Nevertheless, Harper (e.g. table 5.3) teaches several suitable lead free solder alloys that are compatible with the surface mount technology. Harper's table 5.3 discloses melting ranges of common solder alloys. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the bump disclosed by Lam of a lead free alloy such as 95Sn/5Ag as suggested by Harper because this alloy has a relative high melting point, a high creep resistance (see table 5.5), it is more environmental friendly than lead alloys, and because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416

Response to Arguments

39. Applicant's arguments filed on 01/11/2006 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

40. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

41. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

42. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonardo Andújar whose telephone number is 571-272-1912. The examiner can normally be reached on Mon through Thu from 9:00 AM to 7:30 PM EST.

43. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leonardo Andujar
Primary Examiner
Art Unit 2826